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## Reconstruction of two-body B decays in LHCb

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The observed dominance of matter over antimatter in the Universe leads to the hypothesis of the Sakharov conditions for the laws of nature. One of them implies the breaking of the charge-parity (CP) symmetry. The violation of the CP symmetry has been observed in several decays of kaons and  $B$  mesons and is incorporated in the Standard Model via the CKM matrix, describing the quark transitions in the charged current weak interactions.

The Large Hadron Collider (LHC), where protons will collide every 25 ns at a center-of-mass energy of 14 TeV, provides a copious source of  $B$  mesons, offering an excellent facility to study CP violation in the  $B$  meson system. LHCb, one of the four experiments along the LHC ring, is dedicated to the study of CP violation and rare decays in the  $B$  meson system.

Flavor Changing Neutral Currents (FCNC) are forbidden in the Standard Model at the tree level by the GIM mechanism. As a consequence FCNC only appear in the Standard Model when  $2^{nd}$  order loop diagrams are considered. Therefore decays which depend on FCNC, so-called rare decays, are very sensitive to “new physics” phenomena, where, in addition, a strong dependence on virtually exchanged particles might be observed. In particular the  $B_s^0 \rightarrow \mu^+ \mu^-$  Standard Model branching ratio can be enhanced by one to three orders of magnitude according to scenarios implying the existence of supersymmetric particles. Assuming the Standard Model branching ratio, the LHCb sensitivity to the  $B_s^0 \rightarrow \mu^+ \mu^-$  decay has been estimated to be  $4.7 \pm 0.3 \sigma$  with five years of data taking at nominal luminosity.